



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,464	07/18/2003	Wayne L. Johnson	071469-0304543 (PC0109A)	1154
7590 01/24/2008				
Andrej Mitrovic Suite 10 4350 W. Chandler Blvd. Chandler, AZ 85226			EXAMINER MACARTHUR, SYLVIA	
			ART UNIT 1792	PAPER NUMBER
			MAIL DATE 01/24/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/621,464

Applicant(s)

JOHNSON ET AL.

Examiner

Sylvia R. MacArthur

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-17, 19-30, and 18-36 is/are pending in the application.
- 4a) Of the above claim(s) 15-17, 19-30 and 32-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 5-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Election/Restrictions

1. Applicant's election without traverse of claims 1,2, and 5-14 in the reply filed on 11/13/2007 is acknowledged.

Response to Arguments

2. Applicant's arguments with respect to claims 1,2, and 5-14 have been considered but are moot in view of the new ground(s) of rejection. The previously indicated allowable subject matter of the description of the match network having an inductor as recited in the paragraph joining pages 10 and 11. The prior art of Choi et al (US 6,816,029) teaches such a match network. Furthermore, it has been noted that the prior art of Kagatsume et al (US 4,908,095) in view of Collins et al (US 5,210,466) or Pinneo (US 5,902,563) also failed to teach the at least one support arm as recited in claim 1 which is taught in Lai et al (US 6,364,958).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1,2, 5-7, and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagatsume et al (US 4,908,095) in view of Lai et al (US 6,364,958), and Collins et al (US 5,210,466) and Choi et al (US 6,810,029).

Art Unit: 1792

Regarding claim 1: Kagatsume et al teaches a vertically translatable chuck assembly for supporting a workpiece at different locations within a plasma reactor chamber having sidewalls surrounding an interior region, comprising: a chuck base (lower electrode 20) having a perimeter, an upper surface and lower surface; a workpiece support member 21 having a lower surface and an upper surface capable of supporting the workpiece, arranged above said chuck base upper surface; and one or more vertical translation members lifter 19 arranged between and operatively connecting said chuck base and said workpiece support member for supporting and vertically translating said workpiece support member relative to said chuck base.

Kagatsume et al fails to teach a match network and at least one support arm as recited in the invention.

Lai et al teaches at least one support arms 116 in a plasma process chamber. The motivation to provide these arms is to prevent electrical arcing in the chamber according to the abstract of Lai et al. Lai et al fails to teach the use of a match network.

The prior art of Collins et al teaches a match network within the chuck assembly.

Collins et al teaches a VHF,UHF reactor system wherein a match network comprising variable capacitors C1 and C2 are mounted to the workpiece support member lower surface (the lower surface is within the chuck assembly). Note Fig. 1 and 2 illustrate that the match network is in direct electrical communication with the support member lower surface.

Collins et al teaches that the motivation for providing a match network is that the match network is used to eliminate any standing waves and subsequent losses from the input of the matching network and plasma inside the chamber see col 8 lines 9-19. Thus, it would have been obvious to use a match network in the apparatus of Kagatsume et al as modified by Lai et al.

Art Unit: 1792

The match network of Choi et al could be substituted for the match network of Collins et al as it features a variable capacitor and an inductor adjacent the capacitor. The motivation to use this type of match network is the match network helps to reduce the time necessary to achieve an RF match between the RF generator and the RF load, thereby increasing the life of the apparatus.

Regarding claim 2: In order to provide the support arm of Lai et al in the apparatus of Kagatsume et al at least the arm would be adapted to provide mechanical, fluid, electrical and/or pneumatic communication from outside the plasma reactor chamber to said chuck assembly, see col.7 lines 58-65 of Kagatsume et al as these drivers already exist and are coupled with the support means.

Regarding claim 7: Kagatsume et al fails to specifically teach that one or more utility lines and ports pass through the support arm. However, col.9 lines 55-57 teach that arm 10 is extended into chamber 1 and a wafer W is sucked onto the arm 10. This teaching suggests that a utility port and line is provided in the arm to provide suction and ensure that the wafer remains attached to the arm during transfer. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide one or more utility lines and ports in the arm of Kagatsume et al.

Regarding 10: An assembly according to claim 1, further including mechanical means (lifter 19) for vertically translating said workpiece support member relative to said chuck base, see col.5 lines 33-45 of Kagatsume et al.

Regarding 11: An assembly according to claim 10, further including a vertical drive motor 24e external to the plasma reactor chamber and in operable communication with said

Art Unit: 1792

vertical translation members through one said support arm.

Regarding 12: An assembly according to claim 1, wherein said workpiece support member (lower electrode 20) includes one or more cavities (space 93 and 4 through-holes) adapted to receive and circulate cooling fluid within said workpiece support member, and further including a cooling system arranged external to the plasma reactor chamber and in fluid communication with said one or more cavities via one or more cooling fluid lines passing through one said support arm, see col. 5 lines 58-68.

Regarding 13: An assembly according to claim 1, The apparatus of Kagatsume et al further including bellows 27 connected at one end to lower surface of the workpiece support member, and at the opposite end upper surface of the chuck base, see col. 5 lines 52-64.

Regarding claim 14: An assembly according to claim 1, further including a control system 601 (see Fig.8) coupled to the vertical translation members for controlling their vertical translation of Kagatsume et al.

5. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagatsume et al (US 4,908,095) in view of Lai et al (US 6,364,958), Collins et al (US 5,210,466), and Choi et al applied in claims 1,2, 5-7, and 10-14 above, and in further view of in view of Wang et al (US 6,537,011).

The teachings of Kagatsume et al as modified by Lai et al , Collins et al, and Choi et al were discussed above.

Regarding claim8: The modification fails to teach an assembly according to claim 7, wherein said one or more utility ports includes at least one of: a helium port, a nitrogen port, a

Art Unit: 1792

thermocouple port, a current monitor port, a pneumatic push-pin supply port an electrostatic clamp port and a voltage probe port.

Wang et al teaches an apparatus for transferring and supporting a substrate wherein The support member 106 is provided with a temperature controlled base with suggested teachings of fluid channel, heating elements, and other temperature control members (e.g, thermocouples). Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the support member of the apparatus resulting from Kagatsume et al as modified by Collins et al and Lai et al with utility ports that will accommodate the suggested auxiliary process control equipment of col. 5 lines 1-9 of Wang et al. This improves the overall process control and uniformity of the process result.

Regarding 9: An assembly according to claim 7, wherein said utility lines are gathered into a flexible cable designed to accommodate vertical translation of said workpiece support member relative to said chuck base..


Wang et al is provided with element 102, which binds the lines from the support member and keeps them in one location for ease of maintenance.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sylvia R MacArthur
Primary Examiner
Art Unit 1792

January 22, 2008